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# *Indian Standard*

# METHOD FOR DETERMINATION OF RECOVERY FROM CREASING OF TEXTILE FABRICS BY MEASURING THE ANGLE OF RECOVERY

## ( *First Revision* )

UDC 677·064 : 677·017·832

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*April* 1981

# *Indian Standard*

# METHOD FOR DETERMINATION OF RECOVERY FROM CREASING OF TEXTILE FABRICS BY MEASURING THE ANGLE OF RECOVERY

## *( First Revision )*

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# Indian Standard

# METHOD FOR DETERMINATION OF RECOVERY FROM CREASING OF TEXTILE FABRICS BY MEASURING THE ANGLE OF RECOVERY

## ( First Revision )

## 0. FOREWORD

**0.1** This Indian Standard ( First Revision ) was adopted by the Indian Standards Institution on 31 January 1981, after the draft finalized by the Physical Methods of Test Sectional Committee had been approved by the Textile Division Council.

**0.2** This standard was first published in 1968. It has been revised to include the method for determination of crease recovery angle of fabrics in wet state. Also the confusion arising out of the use of the terms 'wrinkle' and 'crease' synonymously side by side in the standard has been eliminated by dropping the use of word 'wrinkle'.

**0.3** The ability of a fabric to retain pressed-in creases and to recover from creasing is an important property, especially in case of apparel fabrics. The need for standardizing a method for evaluating crease recovery of different fabrics has been increasingly felt with the introduction of crease-resistant fabrics. When creasing force is removed from the creased fabric, it tends to recover and the creases in the fabric start diminishing at varying rates. The magnitude of the crease recovery angle as measured according to this standard is taken as an indication of the ability of a fabric to recover from creasing.

**0.4** To familiarize the industry with International System of Units ( SI Units ), the recommended SI Units for use in the textile industry are given in Appendix A.

**0.4.1** Standards of Weights and Measures Act, 1976 also stipulates use of SI units.

**0.5** In reporting the result of a test made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS : 2-1960*.

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*Rules for rounding off numerical values ( *revised* ).

## 1. SCOPE

**1.1** This standard prescribes a method for determination of crease recovery of fabrics by determining the angle of recovery after the removal of creasing force. The method is especially intended for apparel fabrics.

**1.2** This method is not very suitable for weft knitted fabrics as well as limp or very thick fabrics, or fabrics having tendency to curl, since these factors influence the test results to an unacceptable degree.

## 2. PRINCIPLE

**2.1** A crease-free rectangular specimen of prescribed dimensions is folded in half so that the two limbs of the strip touch each other face to face, under a specified load and maintained in the state for a specified period. After the creasing load is removed, the specimen is allowed to recover for a specified time. At the end of recovery period the angle of recovery is measured.

## 3. TERMINOLOGY

**3.1** For the purpose of this standard, ' Crease Recovery Angle ' shall mean the angle formed between the two limbs of a strip of fabric previously folded to form a single crease under prescribed conditions, at a specified time after removal of creasing load.

## 4. SAMPLING

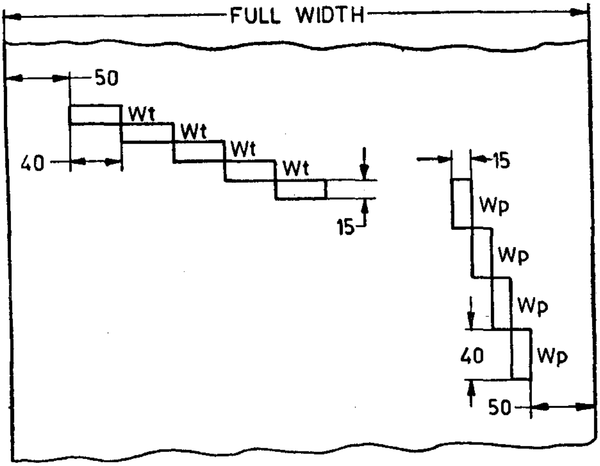
**4.1 Lot** — The quantity of fabric purporting to be of one definite composition, construction and quality delivered to one buyer against one despatch note.

**4.2** Sample drawn in compliance with the specification for the material shall be held to be representative of the lot.

## 5. PREPARATION OF TEST SPECIMENS

**5.1** Cut warpway ( $W_p$ ) and weftway ( $W_t$ ) test specimens of 15 × 40 mm size ( *see* **9.4** ) with the help of sharp pair of scissors or blade with their longer side parallel to warp and weft threads respectively. The specimens shall be staggered in such a way that no two warpway specimens contain the same set of weft yarns. The specimens shall not be taken from creased, wrinkled, bent or other deformed parts of the sample and also not from within 50 mm from the selvedges. One possible layout of cutting warpway and weftway test specimens from one test sample is given in Fig. 1.

NOTE — Warpway test specimens ( that is, with longer side parallel to warp threads ) are used for measuring angle of crease recovery across warp threads and similarly weftway test specimens are used for measuring angle of crease recovery across weft threads.



$W_p$ = Warp test specimens
$W_t$ = Weft test specimens

All dimensions in millimetres.

FIG. 1 LAYOUT OF TEST SPECIMENS

**5.2** In case of warp knitted and non-woven fabrics, the direction parallel to wales ( knitted fabrics ) and the direction marked ' length ' ( non-woven fabrics ) shall be treated as warp direction and the direction parallel to courses ( knitted fabrics ) and direction perpendicular to ' length ' ( non-woven fabrics ) shall be treated as weft direction and the specimens prepared in the same way as in **5.1** for woven fabrics.

**5.3 Number of Specimens** — Not fewer than 20 specimens-10 warpway and 10 weftway among which 5 specimens each face to face and back to back respectively across both warp and weft are to be taken for testing.

**5.4 Wet Specimens** — In case it is desired to test the specimens in wet state, take the specimens and dip in a solution containing 0·1 percent ( *m/v* ) detergent for one minute. Remove the specimens with the help of a forceps and put them on the layers of a good absorbent cloth. Soak the excess water by blotting with blotting paper and applying a load of 500 g for a minute and then test.

## 6. CONDITIONING OF TEST SPECIMENS

**6.1** Prior to test, the specimens shall be conditioned to moisture equilibrium from dry side in a standard atmosphere at 65 ± 2 percent relative humidity and 27 ± 2°C temperature ( *see also* IS : 6359-1971* ).

NOTE 1 — When the test specimen has been left in standard atmosphere for at least 24 hours in such a way as to expose as far as possible all portions of the specimens to the atmosphere, they shall be deemed to have been conditioned satisfactorily.

NOTE 2 — It is preferable to store newly finished fabrics for about a week before conditioning.

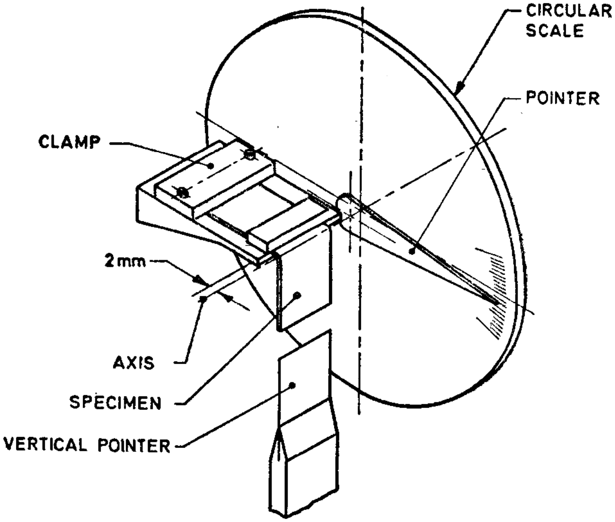


FIG. 2 INSTRUMENT FOR MEASURING THE CREASE RECOVERY ANGLE

## 7. ATMOSPHERIC CONDITIONS FOR TESTING

**7.1** The test shall be carried in the standard atmosphere ( *see* **6.1** ).

## 8. APPARATUS

**8.1 Crease Recovery Tester** — The instrument shall consist of the following essential parts:

a) *A circular scale* in the vertical plane, graduated in degrees along its periphery and capable of being read to an accuracy of ± 0·5° without parallax error.

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*Method for conditioning of textiles.

b) *Specimen clamp* to hold one limb of the specimen in such a way that the fold lies in a horizontal line on the axis of the circular scale, while the distance between the edge of the grip and the axis shall be about 2 mm. The clamp shall be rotatable so as to adjust the free limb of the specimen in the vertical or horizontal position, depending upon the type of instruments used.

c) Means for levelling the apparatus.

NOTE — An outline of the principal parts of a crease recovery tester working on the above principle is given in Fig. 2.

**8.2 Leading Arrangement** — It shall be capable of applying a load of 1 kg uniformly over 15 × 15 mm area of the folded specimen. The arrangements for applying and removing the load shall be such that these operations could be done expeditiously.

NOTE — An outline of the simple loading device is given in Fig. 3.

**8.3 Auxiliary Devices** — Stop watch tweezers with broad spade shaped jaws.

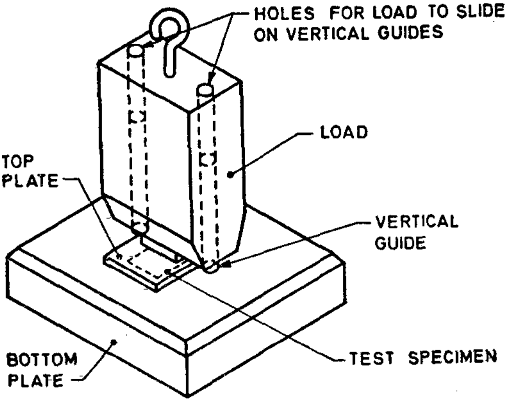

FIG. 3 APPARATUS FOR LOADING TEST SPECIMEN

## 9. PROCEDURE

**9.1** Level the testing equipment with the help of levelling screws and spirit level. The testing equipment shall be screened from draughts, operator's breath and excessive heat radiation from lighting appliances.

**9.2 Loading** — Fold the specimen end to end in half with its edges gripped in one line with the help of tweezers no more than 5 mm from the ends ( *see* Fig. 4 ). Place the folded specimen on the plate of the loading device and apply load gently without delay. Remove the load after 5 minutes. The removal of load shall be completed within 0·5 second.

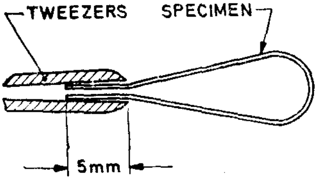

Fig. 4 Folding of Specimen

**9.2.1** Half the number of test specimens (both in case of warpway and weftway test specimens ) shall be folded face to face and the other half back to back.

**9.3 Measurement of Recovery Angle** — After the load is removed, transfer the specimen directly to the clamp of the instrument or place it on edge on a smooth horizontal surface. For mounting the specimen in the clamp, hold one limb of the specimen in the tweezers and place the other limb in the clamp of the instrument in such a manner as to cause as little disturbance to the angle as posible. If the specimen stands on edge, the mounting of the specimen in the clamp shall be done so that it remains in the clamp at least for 1 minute before the angle is measured.

**9.3.1** While the specimen is in the clamp, continue adjusting the clamp in such a way that the suspended limb of the specimen is always in a vertical position or horizontal position depending upon the type of instrument used. Take the reading of the crease recovery angle after 5 minutes from the removal of the load.

Note — If the free limb is not flat, the vertical plane through its centre and the axis of the circular scale ( dial ) shall be taken as basis for the reading of the crease recovery angle.

**9.4** Measure the angle of recovery for all the warpway ( $W_p$ ) and weftway ( $W_t$ ) specimens folded face to face and back to back in the same way. Test at least 10 warpway and 10 weftway test specimens for the test.

## 10. EVALUATION OF RESULTS

**10.1** Calculate the mean value of crease recovery angle to the nearest degree by taking in each instance the test result of 5 specimens, face to face and back to back respectively, across both warp and weft.

## 11. REPORT

**11.1** The report shall include the following information:

a) Name of the instrument used,

b) The type of fabric tested,

c) State of specimen ( wet or dry ),

d) Number of tests performed,

e) Mean value of crease recovery angle for:

  1) Across warp ( Wp );
  2) Across weft ( Wt ); and
  3) Warp and weft total.

f) If required, standard deviation and confidence interval for each case.

NOTE — If the difference between two readings of face to face and back to back specimens is more than 10°, then the results for face to face and back to back specimens shall be reported separately.

# APPENDIX A

( *Clause* 0.4 )

## RECOMMENDED SI UNITS FOR TEXTILES

| Sl No. | Characteristic | SI Units | | Application |
|---|---|---|---|---|
| | | Unit(s) | Abbreviation(s) | |
| (1) | (2) | (3) | (4) | (5) |
| 1) | Length | Millimetre | mm | Fibres |
| | | Millimetre, centimetre | mm, cm | Samples, test specimens ( as appropriate ) |
| | | Metre | m | Yarns, ropes, cordages, fabrics |
| 2) | Width | Millimetre | mm | Narrow fabrics |
| | | Centimetre | cm | Other fabrics |
| | | Millimetre, centimetre | mm, cm | Samples, test specimens ( as appropriate ) |
| | | Centimetre, metre | cm, m | Carpets, druggets, *DURRIES* ( as appropriate ) |
| 3) | Thickness | Micrometre ( micron ) | µm | Delicate fabrics |
| | | Millimetre | mm | Other fabrics, carpets, felts |
| 4) | Linear density | Tex | tex | Yarns |
| | | Millitex | mtex | Fibres |
| | | Decitex | dtex | Filaments, filament yarns |
| | | Kilotex | ktex | Slivers, ropes, cordage |
| 5) | Diameter | Micrometre ( micron ) | µm | Fibres |
| | | Millimetre | mm | Yarns, ropes, cordages |
| 6) | Circumference | Millimetre | mm | Ropes, cordages |
| 7) | Threads in fabric: | | | Woven fabrics ( as appropriate ) |
| | a) Lengthwise | Number per centimetre | ends/cm | |
| | | Number per decimetre | ends/dm | |
| | b) Widthwise | Number per centimetre | picks/cm | |
| | | Number per decimetre | picks/dm | |
| 8) | Warp threads in loom | Number per centimetre | ends/cm | Reeds |
| 9) | Stitches in knitted fabric: | | | Knitted fabrics ( as appropriate ) |
| | a) Lengthwise | Courses per centimetre | courses/cm | |
| | | Courses per decimetre | courses/dm | |
| | b) Widthwise | Wales per centimetre | wales/cm | |
| | | Wales per decimetre | wales/dm | |

| Sl No. | Characteristic | SI Units | | Application |
|---|---|---|---|---|
| | | Unit(s) | Abbreviation(s) | |
| (1) | (2) | (3) | (4) | (5) |
| 10) | Stitch length | Millimetre | mm | Knitted fabrics, made-up fabrics |
| 11) | Mass per unit area | Grams per square metre | $g/m^2$ | Fabrics |
| 12) | Mass per unit length | Grams per metre | g/m | Fabrics |
| 13) | Twist | Turns per centimetre | turns/cm | Yarns, ropes ( as appropriate ) |
| | | Turns per metre | turns/m | |
| 14) | Test or gauge length | Millimetre, centimetre | mm, cm | Fibres, yarns and fabric specimens ( as appropriate ) |
| 15) | Breaking load | Millinewton | mN | Fibres, delicate yarns ( individual or skeins ) |
| | | Newton | N | Strong yarns ( individual or skeins ), ropes, cordages, fabrics |
| 16) | Breaking length | Kilometre | km | Yarns |
| 17) | Tenacity | Millinewton per tex | mN/tex | Fibres, yarns ( individual or skeins ) |
| 18) | Twist factor or twist multiplier | Turns per centimetre × square root of tex | $\text{turns/cm} \times \sqrt{\text{tex}}$ | Yarns ( as appropriate ) |
| | | Turns per metre × square root of tex | $\text{turns/m} \times \sqrt{\text{tex}}$ | |
| 19) | Bursting strength | Newton per square centimetre | $N/cm^2$ | Fabrics |
| 20) | Tear strength | Millinewton | mN | Fabrics ( as appropriate ) |
| | | Newton | N | |
| 21) | Pile height | Millimetre | mm | Carpets |
| 22) | Pile density | Mass of pile yarn in grams per square metre per millimetre pile height | $g/m^2$/mm pile height | Pile carpets |
| 23) | Elastic modulus | Millinewton per tex per unit deformation | mN/tex/unit deformation | Fibres, yarns, strands |

## INDIAN STANDARDS ON PHYSICAL METHODS OF TEST

| IS: | |
|---|---|
| 234-1973 | Linear density of textile fibres ( gravimetric method ) ( *first revision* ) |
| 832-1964 | Twist in yarn |
| 1670-1970 | Breaking load, elongation at break and tenacity of yarns ( *first revision* ) |
| 1954-1964 | Length and width of fabrics ( *first revision* ) |
| 1964-1970 | Weight per square metre and weight per linear metre of fabric ( *first revision* ) |
| 1966-1975 | Bursting strength and bursting distension of fabrics: diaphragam method ( *first revision* ) |
| 1969-1968 | Breaking load and elongation at break of woven textile fabrics ( *first revision* ) |
| 6359-1971 | Conditioning of textiles |
| 6489-1971 | Tear strength of woven textile fabric by elemendorf tester |
| 6490-1971 | Stiffness of fabrics — cantilever test |
| 6668-1972 | Preparing test specimens from fabrics samples for physical tests |
| 7702-1975 | Thickness of woven and knitted fabrics |
| 8357-1977 | Assesment of fabric drape |